

**MOVING YOU FORWARD**

# **Economic Impact Analysis of Transportation Investments: Linking Benefits to Funding**

**OTEC**

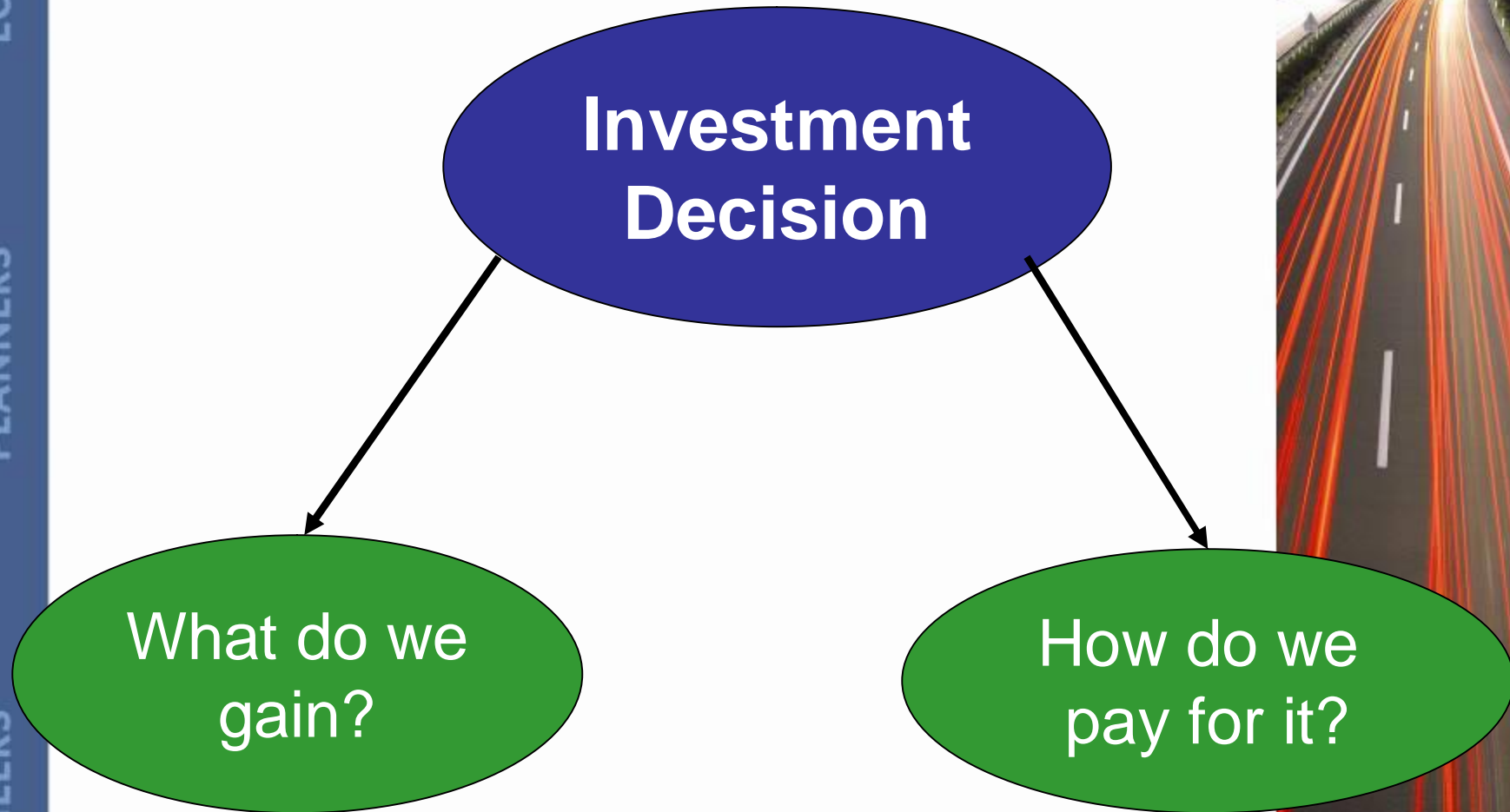
Columbus, OH  
October 24 , 2007

# Goal of the Ohio Study

Develop a replicable methodology to measure the economic and fiscal impacts of a major transportation investment on local governmental units in Ohio, and translate those net revenue streams into a financial strategy.



# Role of Economic Analysis

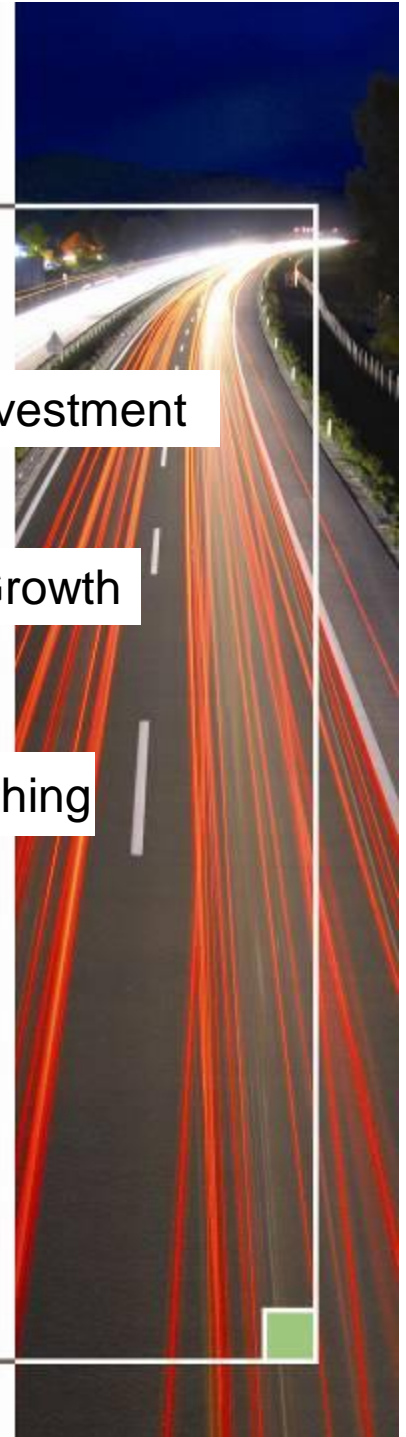
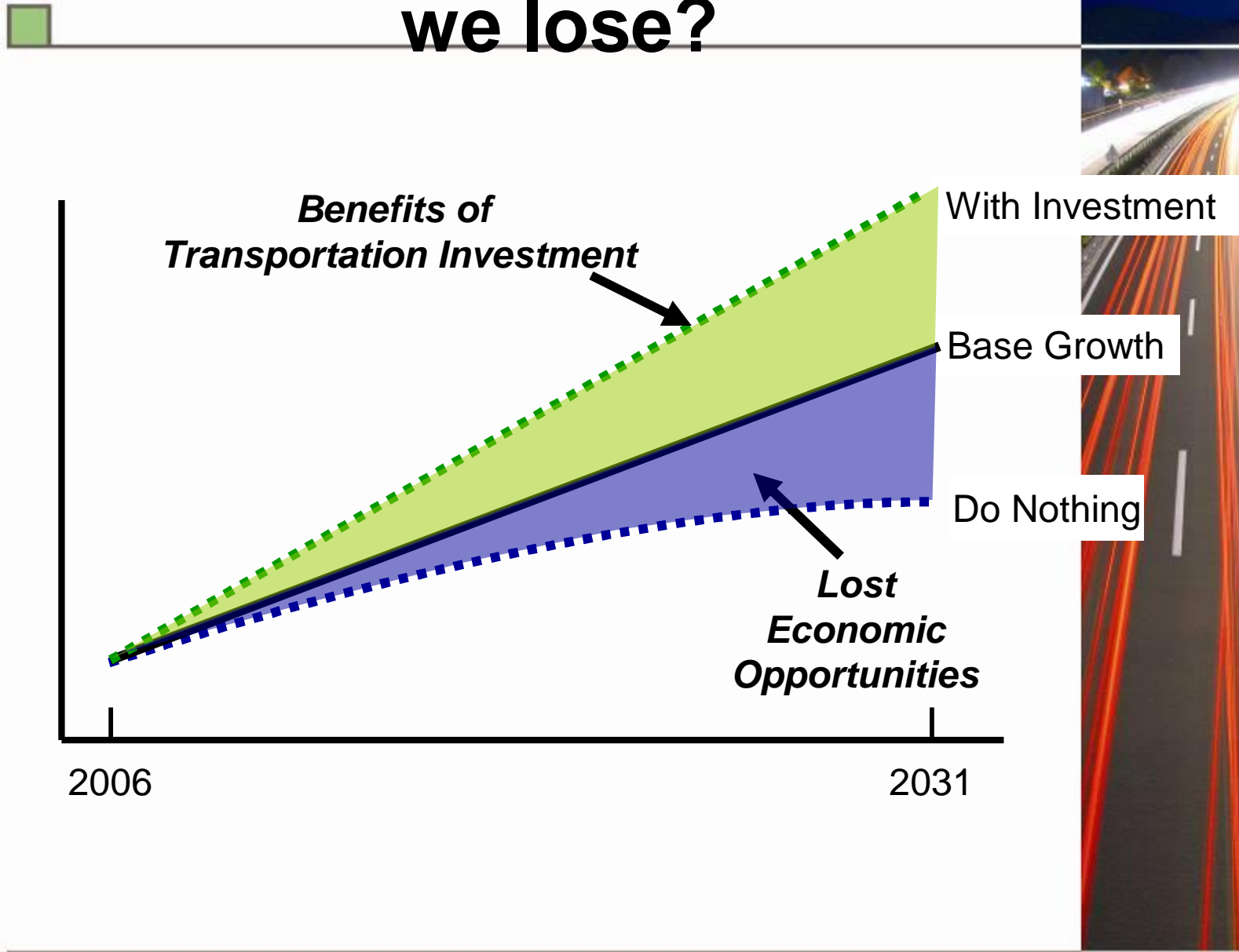


# What do we get...what do we lose?

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# Overview of Analysis Framework

## Step 1- Economic Analysis

Travel Demand Model

Green Infrastructure

Land Use Analysis

**Economic Model**

Travel efficiencies

Net benefits

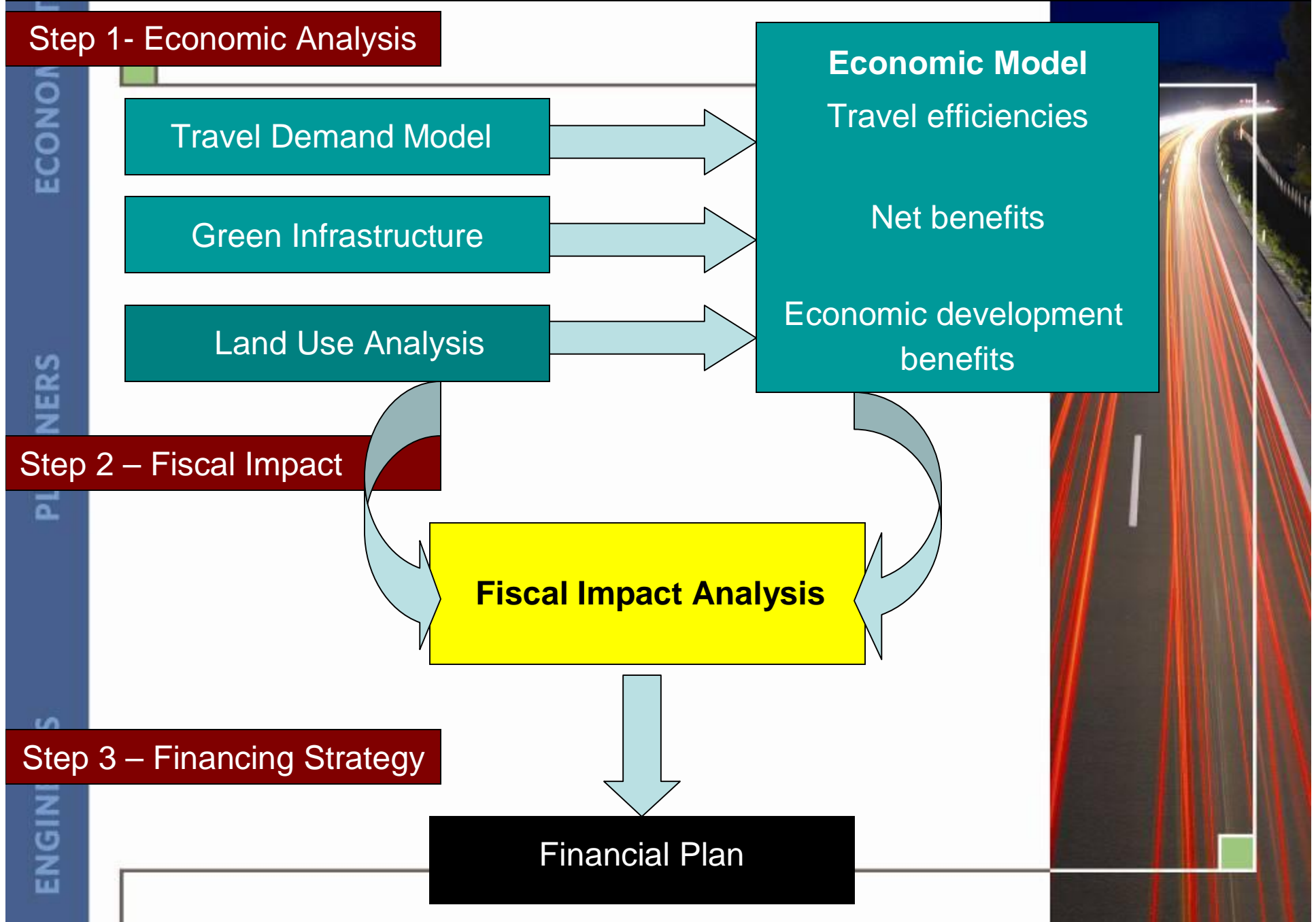
Economic development  
benefits

## Step 2 – Fiscal Impact

**Fiscal Impact Analysis**

## Step 3 – Financing Strategy

**Financial Plan**



# Economic Impact Analysis Methodology



# Transportation Investment

- Implications for Transportation System Users
  - Changes in Travel Patterns
  - Enhanced Connectivity
  - Increased Mobility
  - Changes in the Cost of Doing Business
  - Changes in Consumer Spending

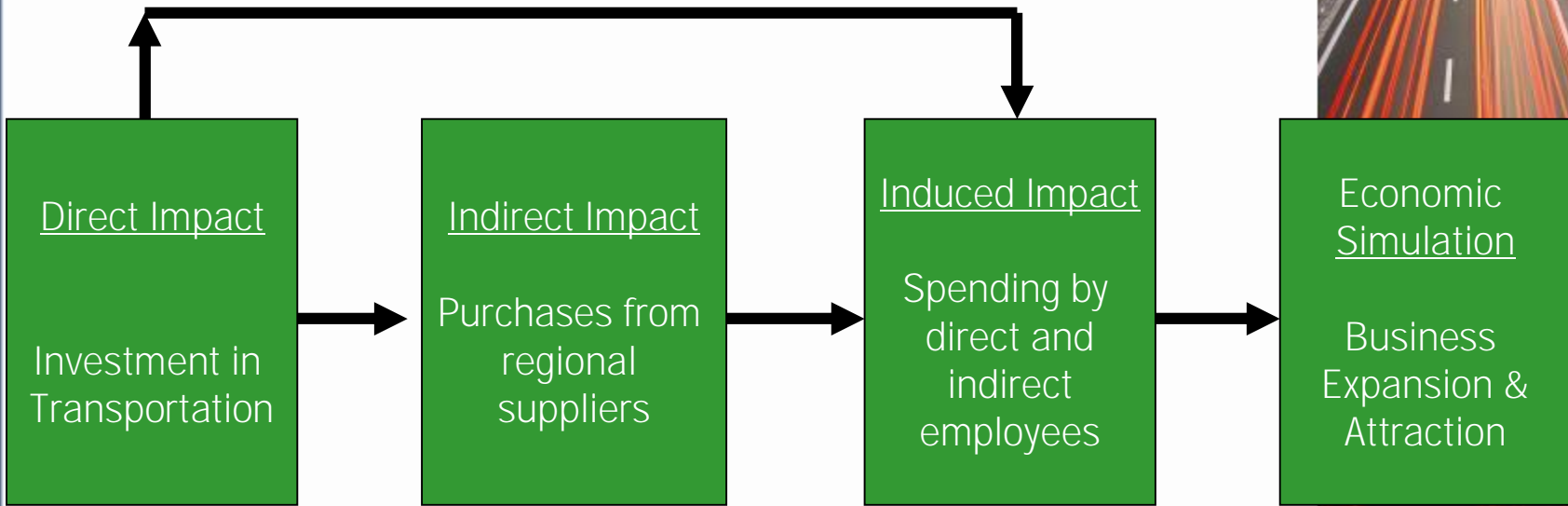


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# Evaluating the Economic Impacts

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# Modeling Process

1. Transportation Network Analysis
  - Travel Demand Model
2. User Benefits
  - Travel Time Savings
  - Safety Cost Savings
  - Emissions Savings
  - Vehicle Operating Cost Savings
3. Direct Economic Benefits
  - Derived from User Benefits
4. Total Economic Benefits
  - The REMI Model



# Converting Travel Demand Model Output Into Economic Policy Variables



# Travel Demand Model

- Assesses regional “cause and effect” related to travel patterns.
- Model Determines Likely Travel Patterns for a future year in terms of:
  - How Many Trips?
  - Where to?
  - What mode?
  - What routes?



# TDM Output

- Change in Vehicle Hours of Travel (VHT)
- Change in Vehicle Miles of Travel (VMT)

Each of these metrics are used to calculate user benefits resulting from a transportation investment



# Direct User Benefits

- Direct user benefits are used to simulate changes in economic policy variables.
- These changes in economic policy variables are used to develop a forecast of economic activity incorporating the transportation investment.



# Calculations

- User benefits based on TDM output
  - Passenger
    - Work
    - Non-work
  - Freight
- Convert user benefits to economic variables
  - Economic value
  - Quality of life value



# Transportation in Economic Model

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Transportation change

Transportation Model

Cost of Service Change

VMT/VHT Impacts

Change in transportation costs

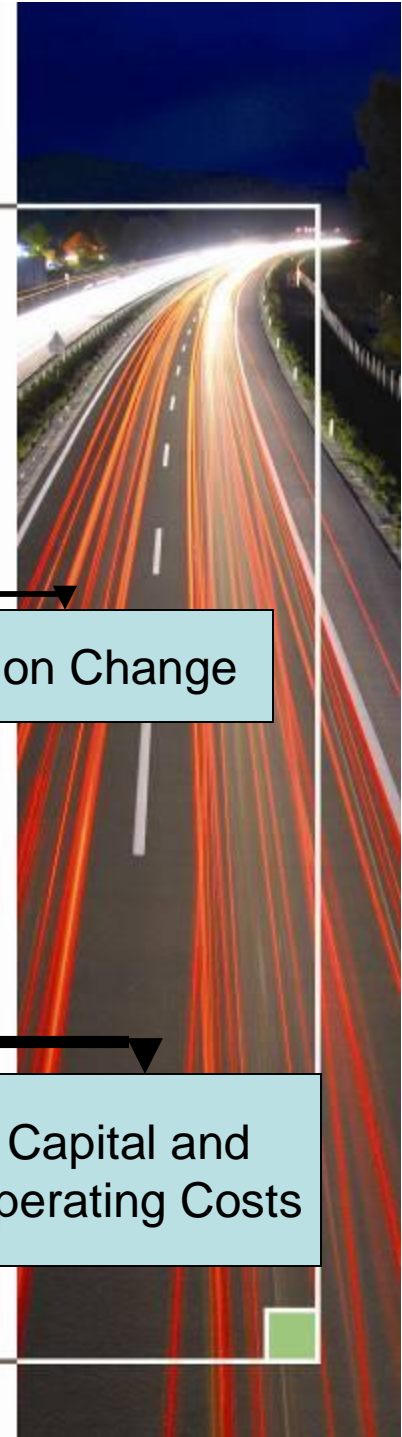
Highway User Impacts

Transit User Impacts

Rail User Impacts

Capital and Operating Costs

Emission Change



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Economic Model



Changes in Economy



Purchasing Power Changes

Change in Taxes

Changes in capital and operating costs



Change in Disposable income



Change in employment and population



# From Travel Data to Economic Impacts

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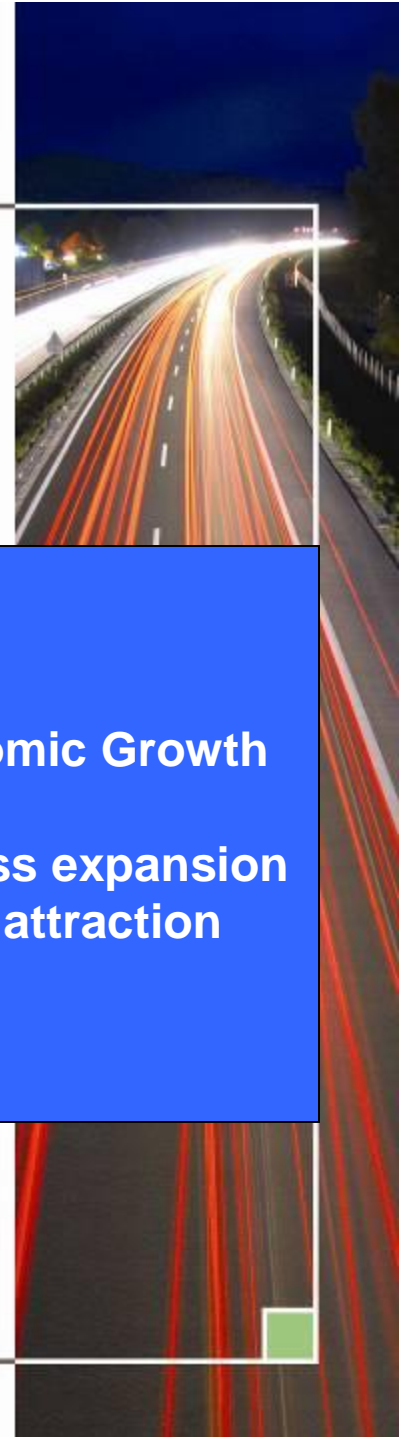
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VMT, VHT from  
TDM

Decreased Travel Time  
Decreased Emissions  
Decreased VOC  
Increased Safety

Decreased costs  
-Transportation  
-Business costs  
-Cost of living  
Increase business  
productivity  
Lower prices

Economic Growth  
Business expansion  
and attraction



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# Input Conversion Process: Personal Travel Time Benefits

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Output from TDM



Classify as business,  
work and non-work

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# Personal Travel - Business

Distribute business VHT  
across industries



Monetize VHT using  
industry wage rates

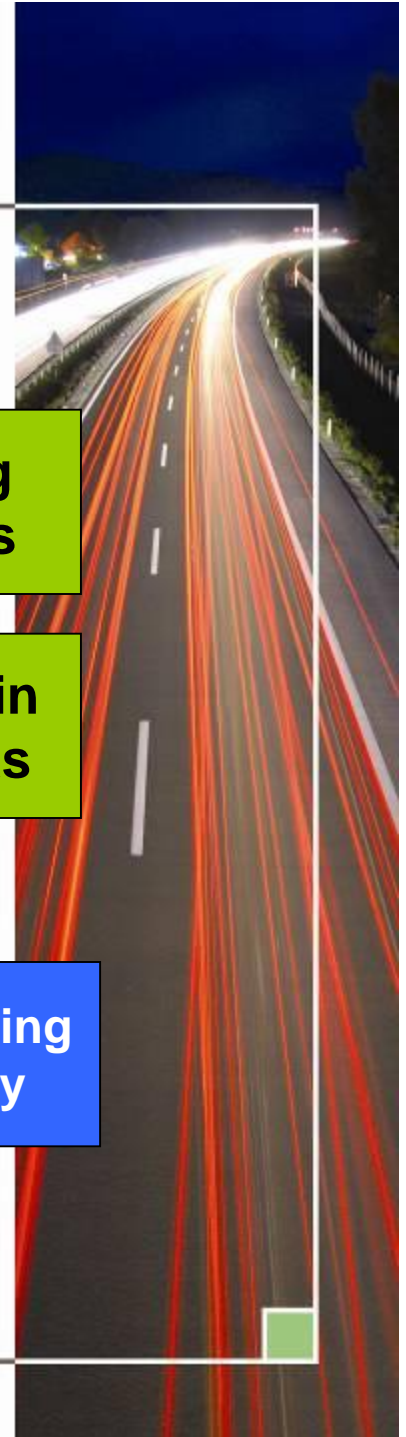
Use TSA to calculate total  
Transportation cost  
by industry



Calculate % change in  
Transportation costs



Changes in cost of doing  
business by industry



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# Personal Travel - Work

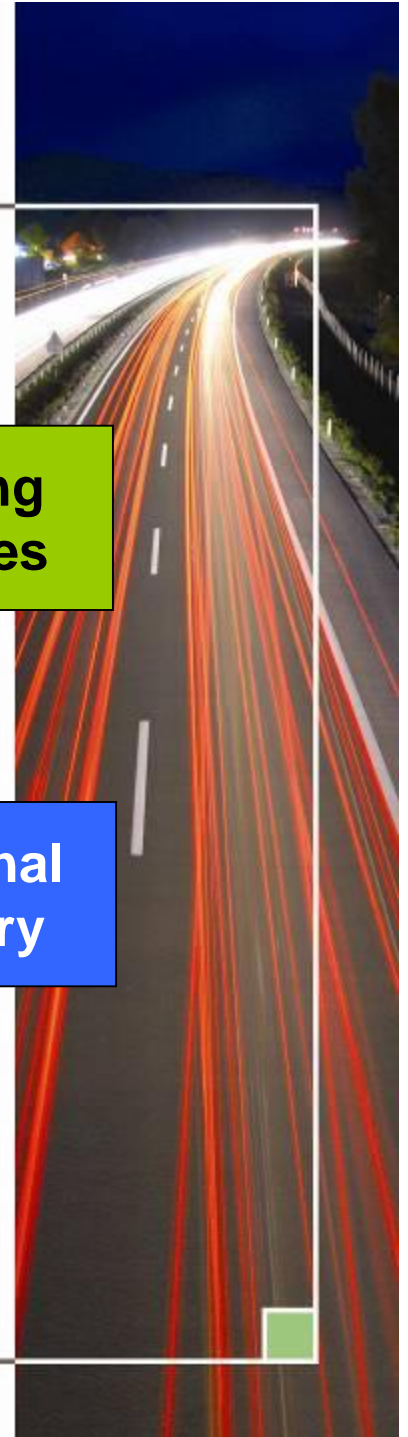
Distribute work VHT  
across industries



Monetize VHT using  
industry wage rates



Changes in personal  
income by industry



# Personal Travel – Non-Work

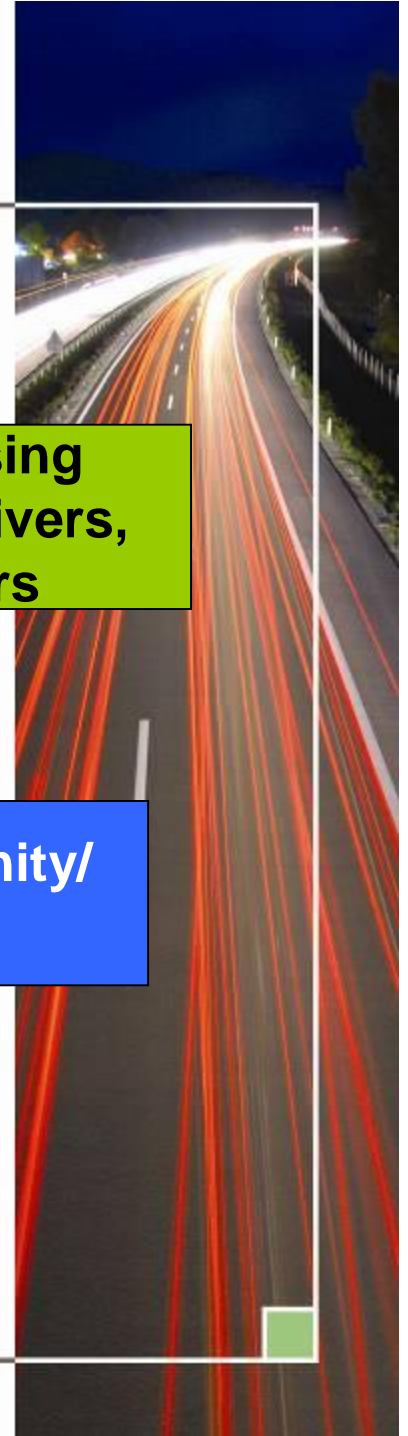
Distribute work VHT across drivers and passengers



Monetize VHT using wage rates for drivers, and passengers



Changes in amenity/  
quality of life



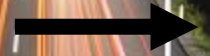
# Input Conversion Process: Truck Travel Time

## Benefits

Calculate changes in  
truck travel time VHTs



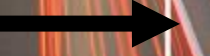
Convert to  
impacted industries



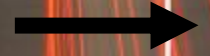
Distribute truck VHT  
across industries



Monetize using avg.  
trucker wage



Calculate % change in  
transportation cost

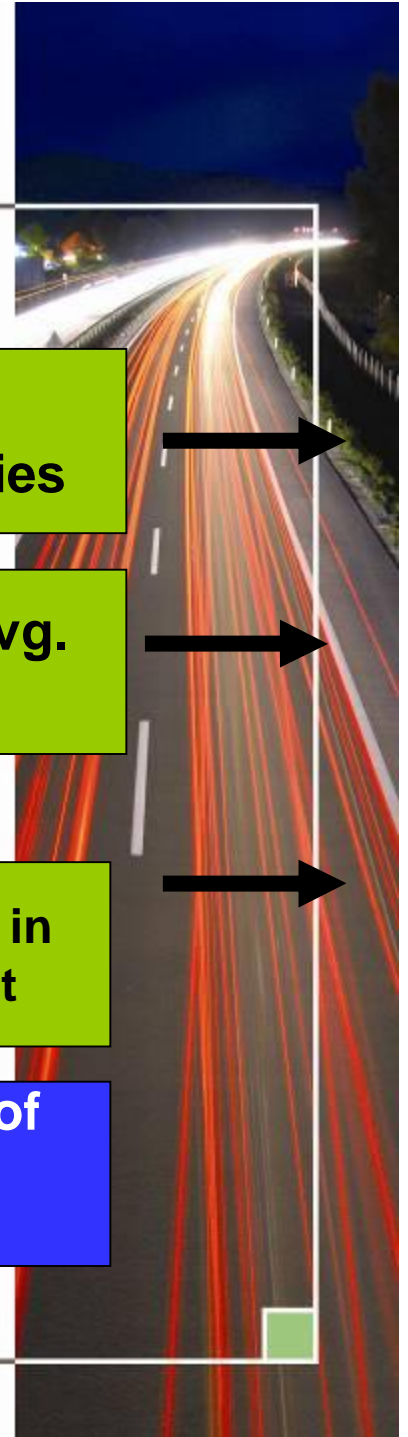


% change in cost of  
doing business  
by industry

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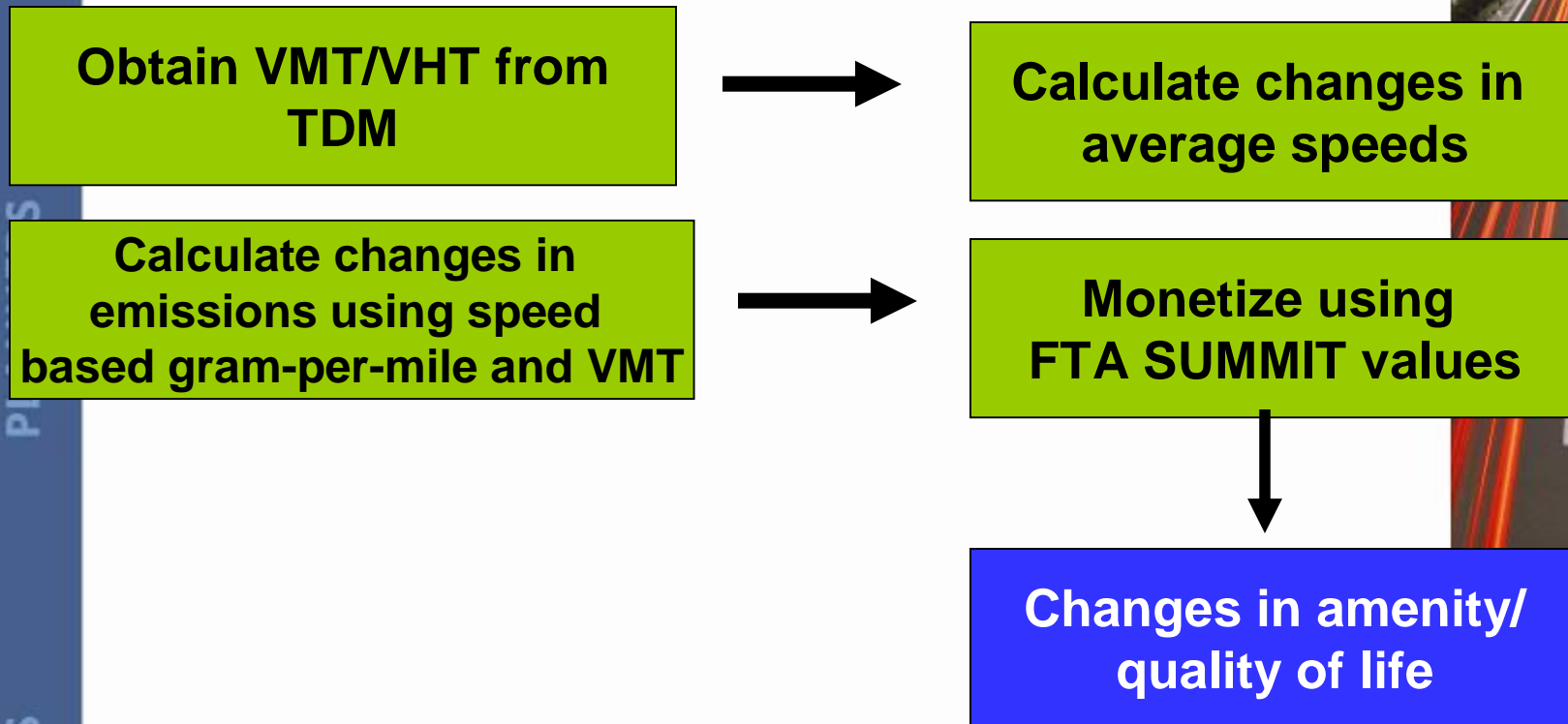


# Input Conversion Process: Emissions

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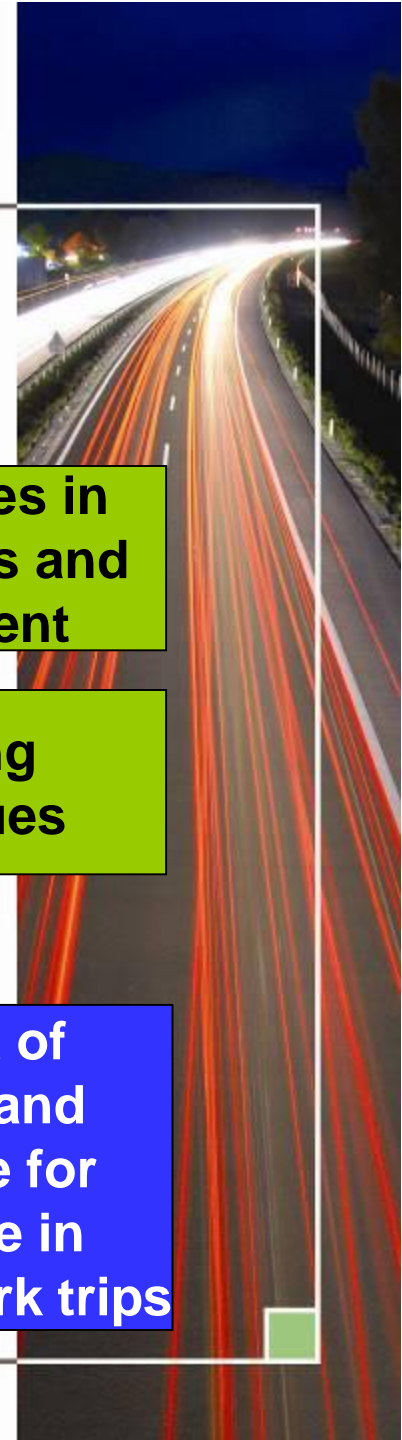


# Input Conversion Process: Safety Costs

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**VMT from TDM**



**Calculate changes in  
average accidents and  
cost per accident**

**Monetize using  
TranSight values**



**Changes in cost of  
doing business, and  
change in income for  
work, and change in  
amenity for non-work trips**



# Input Conversion Process: Vehicle Operating Costs

VMT and VHT from TDM



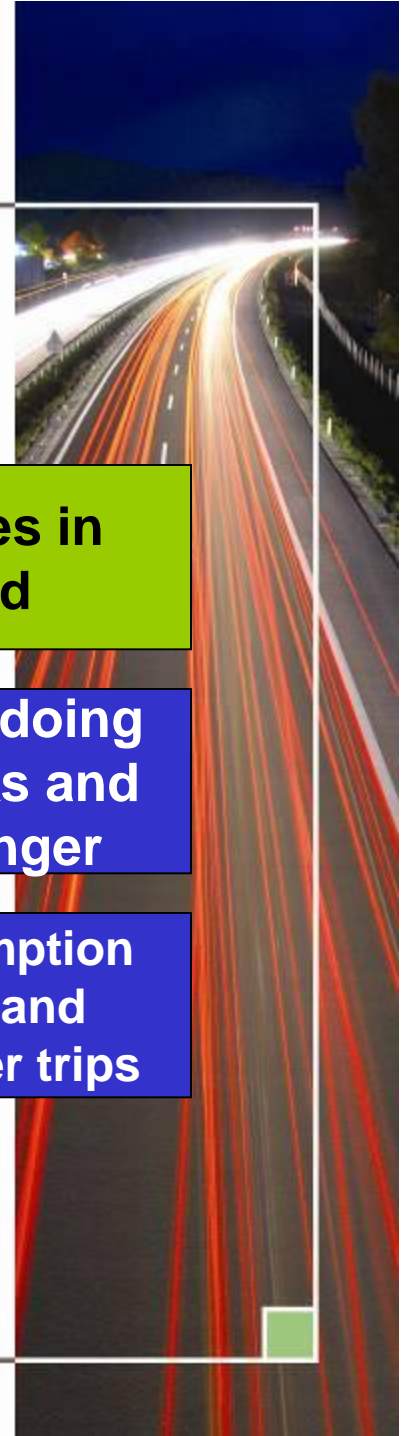
Calculate changes in  
average speed

Calculate VOC costs based on  
average-mile-per-gallon  
wrt speed



Change in cost of doing  
business for trucks and  
business passenger

Changes in consumption  
patterns for work and  
non-work passenger trips



# Strategic Development Impacts



# Positive Impacts

- Transportation infrastructure can generate positive strategic development impacts:
  - Increased mobility of workers
  - Increased accessibility
    - Businesses
    - Residents
  - Enhanced connectivity
    - Economic centers and resources
      - Education and health facilities
  - Attraction of new traffic to an area

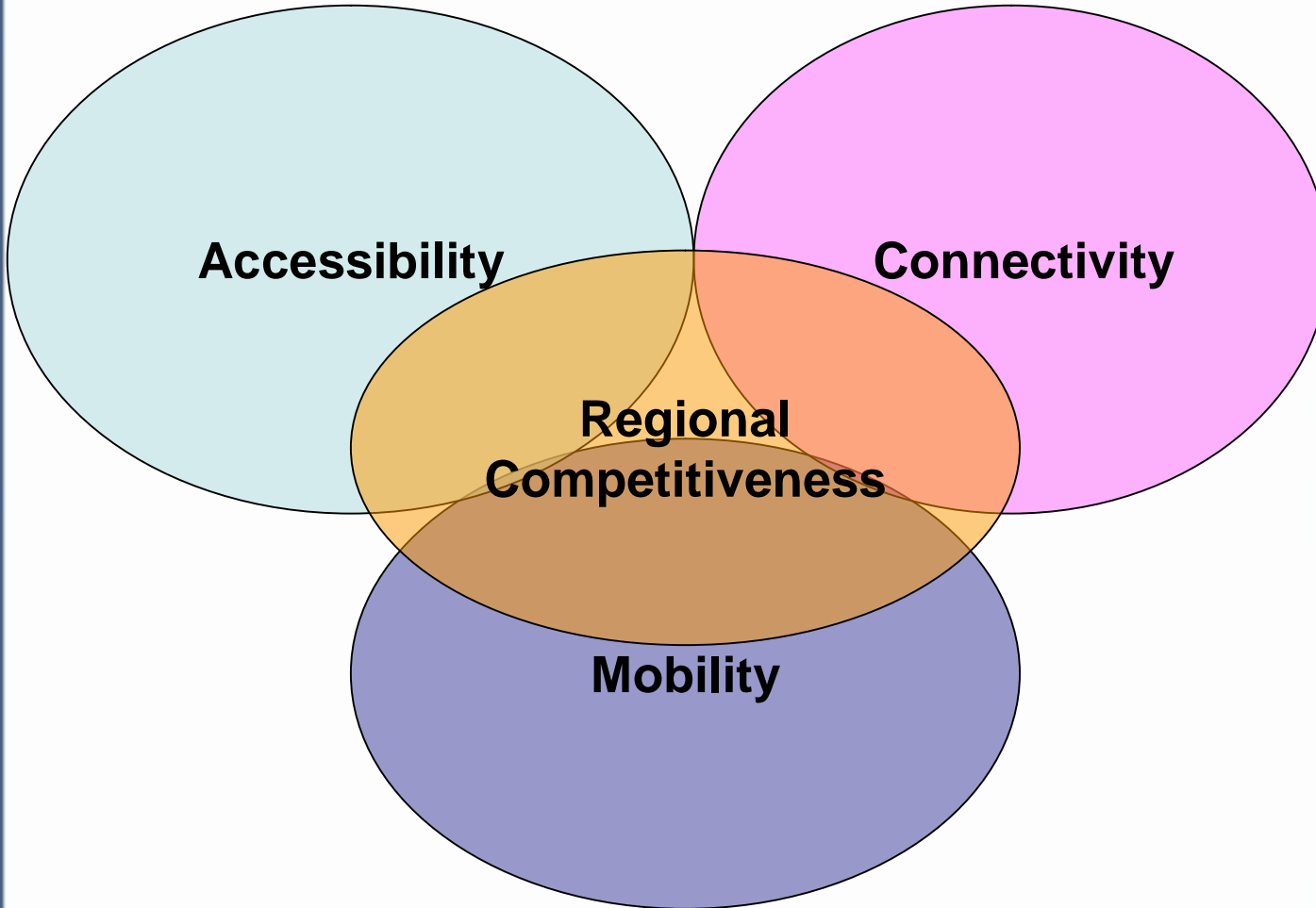


# Strategic Role

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# Modeling

- Evaluates the impact of a transportation investment on economic competitiveness.
- Examines the role of transportation investment in combination with other strategic community investments or attributes.
- Integrates land use.



# Framework Components

- **Economic Base Assessment**
  - Identifies underperforming industries.
- **Transportation intensity**
  - Determines the significance of transportation infrastructure and service in location decisions



# Transportation as a Business

## Location Factor

- Transportation costs
  - Freight rates
  - Efficiency/congestion
  - Reliability
- Transportation Access and Service
  - Air
  - Sea
  - Railroad
  - Highway Facilities



# Strategic Development Impact

- Provides insight into which industries benefit the most from a transportation improvement.
- Examines the business attraction potential associated with transportation investments.
- Estimates job and income growth generated from the investment at the industry level.



# Economic Impact Process Flow Recap

**New Investment in Transportation**



**Travel Demand Model**

**Change in Vehicle Hours of Travel (VHT)  
Change in Vehicle Miles of Travel (VMT)**

**User Benefits**

**Strategic Development Impacts**

**Economic Model**



**Total Economic Impact**

- **Gross Regional Product (GRP)**
- **Personal Income**
- **Employment**

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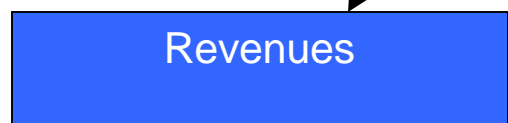
# OVERVIEW OF RESEARCH METHODOLOGY: FISCAL IMPACT

## Historical Data

**Step 1: Collect and evaluate historical financial data**

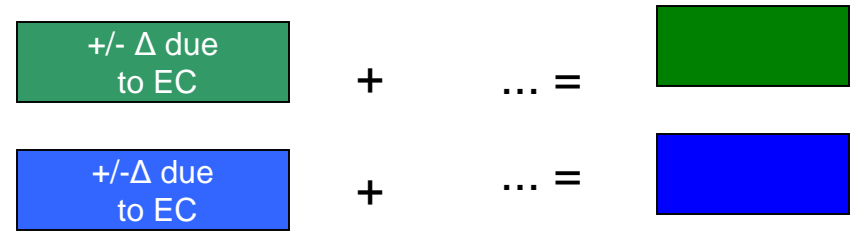


**Step 2: Calculate historical revenue and expenditure factors**



## Incremental Fiscal Impacts

**Step 3: Estimate change in expenditures and revenues**



**Step 4: Calculate net revenues**



# Forecast of Incremental Impacts

- Incremental Expenditure Forecast
  - Operational expenditures
  - Capital expenditures
- Incremental Revenue Forecast
  - Property tax
  - Sales tax
  - Income/earnings tax
  - Others?



# Operational Expenditures

Population impact  
from economic analysis

Interview departmental  
staff on impact of population  
increase

Estimate number of  
required FTEs

Estimate cost associated  
with required FTEs



# Capital Expenditures

- Access current and projected capacity levels
- Identify trigger points based on existing patterns and levels of service to determine timing of needs
- Estimate cost of investments



# Incremental Revenue

- Property Tax
  - Based on outputs from the land use analysis
    - Forecasted property uses by major category, e.g. industrial, commercial, residential, etc.
    - Forecasted assessed values
  - Historical and forecasted tax rate based on discussions with stakeholders
- Sales Tax
  - Function of additional population and employment growth
  - Forecast of growth in consumer spending generated by economic model



# Input to Financial Plan

- Estimate net revenue stream by major revenue category
- Identify categories with positive net revenue stream
- Dedicate future positive net revenue streams to help fund investment

Funding tied to benefits received



# Role of Economic Analysis



**Investment  
Decision**

What do we  
gain?

How do we  
pay for it?

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